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FOSSIL PERISCELIDIDAE (DIPTERA)

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Abstract.—All known fossil species of periscelidid flies occur in amber and are treated. *Periscelis annectans* Sturtevant, from upper Oligocene amber of Chiapas, Mexico, is redescribed and illustrated; it belongs to the subgenus *Myodris* Lioy. Six new amber species are described, all from the lower Miocene–upper Oligocene amber of the Dominican Republic. Three species are: *Periscelis* (*Myodris*): *amberifera, brodzinskyi,* and *fascianota.* Other species are: *Planinasus electra, Stenomicra anacrostichalis* and *S. sabroskyi.* Keys to some genera and subgenera are presented. Despite their rarity in nature, high diversity of periscelidids in Dominican amber is certainly attributable to an association with decaying trees. Presence of modern subgenera in the Oligo-Miocene suggests an origin of periscelidids perhaps in the Paleocene.

Key Words: Diptera, Periscelididae, *Periscelis, Planinasus, Stenomicra,* fossil, amber

Flies of the family Periscelididae are obscure muscomorphans with about 50 described species worldwide. Specimens are rare in collections notably because their habits are often quite specific to tree trunks and logs that are sometimes in a decaying state (Teskey 1976). *Planinasus* Cresson, for example, is frequently found on rotting logs in or near streams in the neotropics, and *Periscelis* Loew and *Stenomicra* Coquillett usually occur at sap fluxes of living trees (many neotropical *Stenomicra* are also found in rolled leaves of *Heliconia* L., living on beetle frass).

Given their predilection for tree trunks and logs, it is not too surprising that an occasional specimen was preserved in amber. Five pieces of amber with six specimens of periscelidids represent the total number of these flies seen in about 20,000 pieces of Dominican amber screened by the senior author. Specimens, thus, are quite rare even as fossils in amber.

Amber is a generic term for fossilized, highly polymerized, resinous sap that can be exuded from a large variety of coniferous and deciduous trees (Langenheim 1969). Although of varying age, pieces date from the Carboniferous (280–345 million years ago), and those from the Cretaceous (65–140 million years ago) are the oldest pieces with insect inclusions. Because of the fine preservation and three-dimensional detail preserved in amber, it is an exceptional mode of fossilization for small, delicate insects like acalyptrate flies (e.g. Baroni-Urbani and Graeser 1987, Henwood 1992).

The large deposits of Baltic amber (also called succinite) have the longest history of research on their fossiliferous inclusions (Bachofen-Echt 1949). These deposits vary in age from Eocene to middle Miocene (Larsson 1978). Hennig (1965, 1967) revised the diverse fauna of acalyptrates in Baltic amber, but no periscelidids are known from that material.

Sturtevant (1963) described the first fossil periscelidid, *Periscelis annectans,* from the upper Oligocene–lower Miocene amber (ca. 25 million years old) of Chiapas in southern Mexico. The locations and stratigraphy of that amber deposit are well established (Hurd et al. 1962, Langenheim et al. 1967). Amber very similar to that from southern Mexico is also found in the Dominican Republic (Langenheim [1990] prefers to call the Mexican and Dominican amber "copal," a term also generally applied to amber from New Zealand). Like the material from Chiapas, Dominican amber also has fine clarity (and even better preservation of inclusions), and both are derived from canopy-sized trees of the tropical legume genus *Hymenaea* L. (Langenheim 1969, Cunningham et al. 1983, Hueber and Langenheim 1986). Dominican amber from the Cordillera Central also appears to be contemporaneous with the Mexican amber. The stratigraphy, however, is very incomplete, being based solely on benthic Foraminifera from the Palo Alto mine (Baroni-Urbani and Saunders 1982) among the 15 or so deposits in this region (Martinez and Schlee 1984). Dating based on lithology has also been done (Brouwer and Brouwer 1982). An Eocene age is repeatedly cited by a few investigators (Poinar and Cannatella 1987, Poinar and Singer 1990). That date is an extrapolation from a chemical study (Lambert et al. 1985) and needs to be confirmed with stratigraphy. In the Cordillera Oriental of the Dominican Republic, there are very recent deposits of fossilized resins that are perhaps only several thousand years old. That material is easily identified on the basis of its very light color, softness, fine surface cracks, and manner of preservation of enclosed insects.

We take this opportunity to redescribe and illustrate *Periscelis annectans* and the five other Dominican fossils. The phylogenetic position of the fossil species will hopefully be incorporated into cladistic analyses of modern species. However, comprehensive revisions of the modern species are first needed. Those now underway are as follows: *Planinasus* (Mathis and Baptista), New World *Periscelis* (Mathis and Papp), and New World *Stenomicra* (Sabrosky and Grimaldi). The magnitude of the problem for descriptive taxonomy of these flies is illustrated by *Stenomicra*: 20 species worldwide are described, but about 100 new ones exist for the neotropics alone (Sabrosky, pers. comm.). It will be several years before these revisions are complete. That fact plus the distinctive nature of the fossil species compels us to provide descriptions and new names for the Dominican amber species.

Methods.—The authenticity of the amber specimens was determined by visual inspection (e.g. color, clarity, details of preservation), as well as by several simple, standard tests. Although the exact provenance of the Dominican amber specimens is unknown, it can be conservatively estimated to be lower Miocene–upper Oligocene in age as they match specimens of known provenance. Cutting, grinding, and polishing of specimens followed the procedures given in Grimaldi (1993). The Dominican amber specimens are deposited in the Entomology Department, American Museum of Natural History. The piece of Chiapas amber is deposited in the Department of Paleontology, University of California, Berkeley, California.

Morphological terminology follows McAlpine (1981). In the descriptions, the term ipsilateral is used, as in standard medical terminology, to refer to structures on the same side in bilaterally symmetrical animals.

Family Periscelididae Oldenberg

Periscelidinae Oldenberg, 1914: 41.

Periscelidae.—Hendel, 1916: 297 [first use giving family status].

Periscelididae.—Stackelberg, 1933: 4 [first use with correct orthography].

Diagnosis.—*Head:* Frons with 1–2 fronto-orbital setae; postocellar setae present and divergent or absent. Pedicel cap-like, with a dorsal cleft, bearing 1 or more dorsoapical setae; flagellomere 1 frequently sharply deflexed, arising from ventral surface of pedicel; arista pectinate (sometimes bipectinate). Face uniformly sclerotized and arched, setose laterally.

Thorax: Dorsocentral setae usually 2 (0 + 2), sometimes 1 (0 + 1), none presutural; posterior intra-alar seta reduced; scutellum with 1–2 pairs of marginal setae; scutellar disc bare; 2 notopleural setae; anepisternal seta usually lacking (present in *Planinasus*). Wing: subcosta rudimentary, not reaching costal margin nor fused apically with R_1; no costal breaks (a weakness in the costa just apicad of the humeral crossvein in *Planinasus*); costa extended to R_{4+5} or M; cell dm with a fold running entire length; cell *cup* present, although vein CuA_2 either well developed or extremely reduced. Mid tibia bearing prominent, apicoventral seta.

Discussion.—We accept McAlpine's concept of Periscelididae (1978, 1983, Mathis 1992), including a few genera that were assigned to Aulacigastridae (*Cyamops* Melander, *Planinasus* Cresson, and *Stenomicra* (Coquillett). McAlpine characterized Periscelididae primarily by the cap-like pedicel, which has a dorsal cleft. This character occurs in all Periscelididae but also in Neurochaetidae (McAlpine 1978, Woodley 1982) and perhaps other genera. Perhaps these genera should likewise be included in Periscelididae, with the cap-like pedicel as a synapomorphy.

KEY TO SUBFAMILIES OF PERISCELIDIDAE

1. Fronto-orbital seta 1; ocellar setae present. Costa short, extended to vein R_{4+5}; CuA_2 weak or lacking, cell *cup* absent; postpronotum bearing a well-developed seta .... Periscelidinae
– Fronto-orbital setae 2; ocellar setae absent. Costa long, extended to vein M; CuA_2 usually well developed, usually with a distinct cell *cup* (weak or lacking in *Stenomicra*); postpronotum lacking a well-developed seta .... Stenomicrinae

Subfamily Periscelidinae Oldenberg

Periscelidinae Oldenberg, 1914: 41.

Diagnosis.—*Head:* Eye microsetulose (bearing interfacetal microsetulae); occiput with a silvery white, microtomentose area immediately adjacent to posterior margin of compound eye; frons with only 1 reclinate fronto-orbital seta; postocellar setae present, divergent; ocellar setae present, well developed; face uniformly sclerotized and transversely arched (shield-like in *Scutops*); face setose laterally, strongly receded ventrally, extended laterally below gena; gena extended anterodorsally, bearing a row of setae, with anterior seta inserted well above oral margin; mouth opening large.

Thorax: Postpronotal seta well developed. Wing with costa extended to R_{4+5}; cell *cup* either lacking or present but very weakly developed and with vein CuA_2 extremely reduced.

Abdomen: 7th spiracle ("stigma") not free in female postabdomen. See Griffiths (1972) for discussion of male terminalia.

Discussion.—The immature stages, and to an extent the adults, are associated with sap from bleeding deciduous trees (oak, elm, and cottonwood). Teskey (1976) described and figured a larva of *Periscelis* sp.

The genera comprising Periscelidinae are those that Hennig (1969) included in his more restricted concept of the family, viz: *Periscelis* Loew, *Marbenia* Malloch, *Neoscutops* Malloch, *Scutops* Coquillett, and possibly *Diopsosoma* Malloch (we doubtfully include the latter). Certainly the first four genera comprise a well-established monophyletic assemblage, with corroborative synapomorphies as follows: 1. Mouth opening large. 2. Occiput with a silvery white, microtomentose area immediately adjacent to the posterior margin of the compound eye. 3. One fronto-orbital seta, reclinate. In the subfamily Stenomicrinae there are two fronto-orbital setae, a reclinate and proclinate seta. 4. Costal vein short, extended only to vein R_{4+5}. The generalized condition, found in related genera and families, is for the costal vein to extend to vein M. 5. Vein CuA_2 reduced or absent. Typically this vein is present, resulting in a well-defined cell *cup*. Its reduction or absence here is an autapomorphy. 6. Several characters of the male terminalia (see Griffiths 1972).

Only the genus *Periscelis* of this subfamily has any known fossils, and all are known from amber only. Sturtevant (1963) described the first fossil species, *P. annectans*, from amber taken in the state of Chiapas, Mexico. Here we include an additional three species, all from Dominican amber.

Genus *Periscelis* Loew

Periscelis Loew, 1858: 113. Type species: *Periscelis annulipes* Loew, by subsequent designation (Sturtevant 1923: 1).—Duda, 1934: 5 [revision palearctic species].—Sabrosky, 1965a:710 [nearctic catalog].—Pires do Prado, 1975: 1 [neotropical catalog].—Papp, 1984a: 233–234 [palearctic catalog]; 1988: 273–284 [discussion, figures].

Sphyroperiscelis Sturtevant, 1923: 1. Type species: *Sphyroperiscelis wheeleri* Sturtevant, by original designation.—Sturtevant, 1954: 551 [synonymy].

Description.—*Head:* Face distinctly angulate or with a protrudent, transverse carina in lateral view; dorsal ½ of face narrow, not distinctly and broadly flattened or shield-like, ventral half of face lacking transverse furrows. Eye normal, not borne on a conspicuous stalk; pedicel cap-like, not porrect.

Thorax: Scutellum broadly rounded apically, lacking patch of long setae apically. Chaetotaxy as follows: posterior dorsocentral setae 2; presutural seta lacking; prescutellar acrostichal setae variable, depending on species group; 1 supra-alar seta. Wing mostly hyaline; apical section of vein M straight or very shallowly arched; vein R_1 bare above; vein R_{2+3} more or less evenly arched throughout length except just before apex.

Abdomen: Male genitalia, see diagnosis of subgenera.

Discussion.—All fossil species of *Periscelis* belong to the subgenus *Myodris* Lioy, which is distinguished from the other subgenera by characters indicated in the following key.

KEY TO SUBGENERA OF *PERISCELIS*

1. Prescutellar acrostichal setulae moderately well developed, distinct from other acrostichal setulae; crossvein dm-cu straight and well developed throughout length; male genitalia lacking digitiform process at base of epandrium between surstylus and cercus .... *Myodris* Lioy

– Prescutellar acrostichal setulae undifferentiated; crossvein dm-cu weakened to completely attenuate anteriorly, usually angulate or curved toward base, sometimes nearly straight; male genitalia with a ventrally oriented, narrow process at the ventral margin of the epandrium between the surstylus and cerci 2

2. Mesonotum mostly bare of microtomentum, shiny and with bicolored pattern of dark brown and yellowish orange; cercus of ♂ bearing 5 stout, teeth-like setae along anteroventral surface; large species, length 2.7 mm or longer .... *Notioscelis* Mathis

– Mesonotum invested with microtomentum, appearing somewhat dull, mostly unicolorous; cercus of ♂ bearing several long setulae, especially posteriorly, but not teeth-like setae; small species, length 2.5 mm or smaller .... *Periscelis* Loew

Subgenus *Myodris* Lioy

Myodris Lioy, 1864: 1103 [as a genus]. Type species: *Notiphila annulata* Fallén, by original designation.—Mathis, 1992: 1993: 15 [key, as a subgenus of *Periscelis*].

Meronychina Enderlein, 1914: 327 [as a genus]. Type species: *Notiphila annulata* Fallén, by monotypy.—Enderlein, 1917: 72 [as *Meronychia*, sic].—Sturtevant, 1954: 556 [synonymy with *Periscelis*].

Microperiscelis Oldenberg, 1914: 37, 42 [as a genus]. Type species: *Notiphila annulata* Fallén, by subsequent designation (Sturtevant, 1923:1).—Sturtevant, 1923: 1 [synonymy with *Periscelis*].

Phorticoides Malloch, 1915: 86 [as a genus]. Type species: *Phorticoides flinti* Malloch, by original designation.—Sturtevant, 1954: 556 [synonymy with *Periscelis*].

Diagnosis.—*Thorax:* Mesonotal vestiture variable, essentially bare or densely microtomentose, with the scutum mostly gray but with a brown, median stripe on posterior ½–⅔; prescutellar acrostichal setae well developed. Wing completely hyaline to maculate; crossvein dm-cu complete and equally well developed along its length.

Abdomen: Male genitalia as follows: epandrium and surstylus connected to internal structures of genitalia by membranes only; cercus well sclerotized, longer than wide, becoming narrower ventrally, bearing several long setae and 2, stout, tooth-like setae at apex; surstyli usually asymmetrical to some degree, narrow and acutely pointed apically, bearing sparse, short setulae; lacking a process between bases of surstylus and cercus; gonite distinct and comparatively long, as long or longer than the surstylus.

Discussion.—Seven species now comprise this subgenus, including three that are extant (*P. annulata* (Fallén), *P. flinti* (Malloch), and *P. kabuli* Papp) and the four fossil species that are keyed and described in this paper.

KEY TO FOSSIL SPECIES OF THE SUBGENUS *MYODRIS*

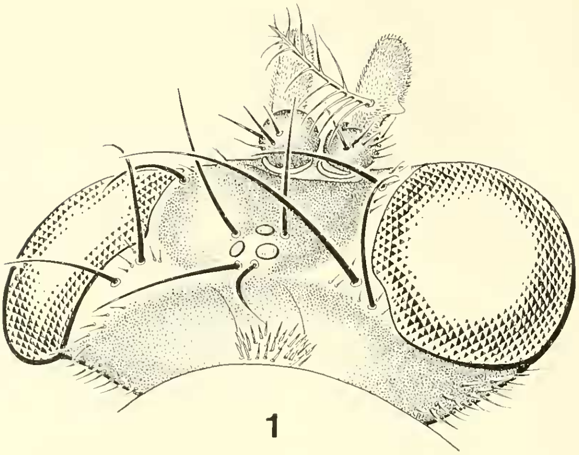
1. Thorax appearing densely microtomentose, mostly pale gray with some brown spots; fore femur with 3 prominent setae along apical ⅓ of posteroventral surface; tibiae uniformly colored . . . . *P. brodzinskyi,* new species
– Thorax appearing uniformly dark brown and lacking dense microtomentum; fore femur with 5–6 prominent setae along apical ⅓ of posteroventral surface; tibiae with alternating dark and pale bands 2
2. Frons including ocellar triangle uniformly pale brown; face lacking dark spot in middle . . . . *P. amberifera,* new species
– At least ocellar triangle dark brown, contrasted with paler remainder of frons; face with dark bigeminate spot in middle 3
3. Acrostichal setulae numerous, in about 6 irregular rows. Apical scutellar setae strongly cruciate before midlength of setae. Pleuron with a midpleural dark band, extended from anepisternum to katatergite; katepisternum darker than remainder of pleuron . . . . *P. facianota,* new species
– Acrostichal setulae fewer, in about 4 rows. Apical scutellar setae cruciate at apical ⅕. Pleuron uniformly dark colored and lacking a midpleural band . . . . *P. annectans* Sturtevant

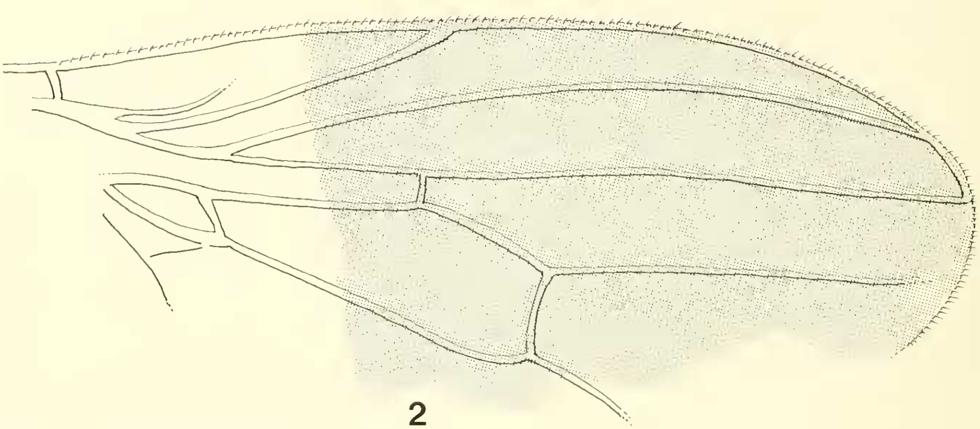
Periscelis (*Myodris*) *amberifera* Grimaldi and Mathis, NEW SPECIES

Figs. 1, 2

Description.—*Head* (Fig. 1): Frons, including ocellar triangle, brownish yellow to yellow; fronto-orbital seta inserted near eye margins; inner and outer vertical setae inserted close together, distance between about 3 times setal width at base; inner vertical seta very long, length nearly twice outer vertical; ocellar setae inserted just laterad of ocellar triangle, long, extended past lunule; postocellar setae about equal in length to ocellars, divergent. Antenna: pedicel dark brown, scape and flagellomere 1 concolorous, pale, mostly yellow; pedicel bearing 2 large, black, lateral setae and 1 large medial seta; arista with 7 dorsal and 3 ventral branches; no supernumerary lateral trunk (as in species of *Planinasus*). Face obscured. Genal setulae dense, long.

Thorax: Mesonotum, pleuron, and postnotum uniformly dark brown. Acrostichal setulae irregularly arranged, not in rows; katepisternum bearing 1 large and 1 smaller setae; distance between ipsilateral dorsocentral setae about ½ length of either seta; distance between dorsocentral rows wide, about equal to length of a seta; a pair of prescutellar acrostichal setae between posterior dorsocentrals, length and thickness ⅓ that of posterior dorsocentral seta, distance from posterior dorsocentral about equal to length of smaller seta; scutellum with 2 pairs of setae; apical pair twice length of anterior pair. Halter pale. Wing (Fig. 2) with uniform light infuscation on apical ⅔; vein R_1 long, extended to nearly midway along costal vein; vein R_{2+3} arched; veins R_{4+5} and M_1 parallel; vein M_1 ended just short of wing margin; cell dm large, wider than distance between veins R_{4+5} and M_1. Legs: fore femur





Figs. 1, 2. *Periscelis amberifera*. 1, head, posterodorsal view; 2, wing.

dark brown, with row of 8–9 setae along posterior surface, lengths slightly greater than femoral width; apical ⅕ of all femora pale; tibiae with 2 dark bands, ⅖ and ⅘ along length of tibia; tarsomeres pale, except pretarsus, which is dark; basitarsomere about equal in length to all other tarsomeres.

Abdomen: Dorsoventrally somewhat flattened, sides tapered apically. Tergites pale brown.

Measurements.—Head width and thorax length not measurable; body length 2.63 mm, wing length 1.76 mm.

Type material.—Holotype ♀ (AMNH DR-8-207A): the specific provenance is unknown within the Dominican Republic; the inclusion is in a large piece of amber (4.0 × 3.3 cm) that is dark yellow and has several small inclusions, including a male ant and a mymarid wasp.

Etymology.—The species epithet, *amberifera*, refers to the holotype being an inclusion borne in amber.

Remarks.—This species is very similar to *P. facianota* but is distinguished from the latter by the coloration of the frons, including the ocellar triangle, which is generally pale brownish yellow to yellow.

Periscelis (*Myodris*) *facianota* Grimaldi and Mathis, New Species

Figs. 3–5

Description.—*Head* (Figs. 3, 4): Frons mostly pale, brownish yellow, except for dark brown ocellar triangle and broad area immediately adjacent. All setae black. Fronto-orbital setae inserted about midway along length of frons, very close to eye margin, length about same as outer vertical seta; inner vertical seta slightly longer than outer seta, with slightly curved tips; distance between inner and outer vertical setae about 4–5 times diameter of setal bases (best seen in dorsal view); ocellar setae inserted slightly outside triangle, lateral to sides joining anterior and posterior ocelli; postocellar seta with acute bend at base, strongly divergent, lying immediately behind posterior ocelli. Posterodorsal margin of frons forming acute angle with posterior surface of head, this edge quite sharp; posterior surface of head dark brown, slightly concave. Antenna: pedicel velvety black, strikingly contrasted with remainder of yellow antenna and frons, bearing 3 stout dorsolateral setae and 1 ventrolateral seta (some dorsolaterals with apex slightly curved), 1 large dorsal seta and several smaller proximal ones dorsolateral to it; flagellomere 1 yellow; arista with 6 dorsal, 3 ventral branches, plus small terminal fork and about 8 minute medial branches [apices of arista inadvertently sheared off during a later preparation]. Face slightly carinate, with bigeminate black spots in middle of face between narrowest area separating eye margins. Gena bearing 3 setae above frontal-genal suture, pointed ventrolaterally; row of 6 setae below suture. Clypeus and palp black; clypeus with pointed frontal surface.

Thorax (Fig. 3): Mesonotum uniformly dark brown. Pleuron mostly pale, with a midpleural dark band, extended from anepisternum to katatergite; at least katepisternum apparently dark, but much of pleuron is obscured. Acrostichal setulae arranged in about 6 irregular rows between anterior dorsocentrals; posterior dorsocentral setae about twice the length and thickness of the anterior dorsocentral setae, slightly curved, convergent; lateral thoracic setae all quite thick, curved, and stiff; 1 stout postpronotal seta; postalar seta curved posterodorsad and adpressed to notum; 2 large katepisternal setae. Anterior scutellar setae convergent, lying close along sides of scutellum; apical scutellars twice the length of anterior scutellar setae, crossed for about ⅔ their length, slightly upright. Wing (Fig. 5): slightly infuscate but without markings; veins R_{2+3}, R_{4+5}, and M parallel; vein CuA_1 incomplete. Halter pale. Legs: femora slightly brown; fore femur with row of about 10 stout setae on ventral surface; tibiae with 2 dark bands, forming yellow apical, middle, and proximal bands; tarsomeres 1 and 2 pale brown, remainder paler.

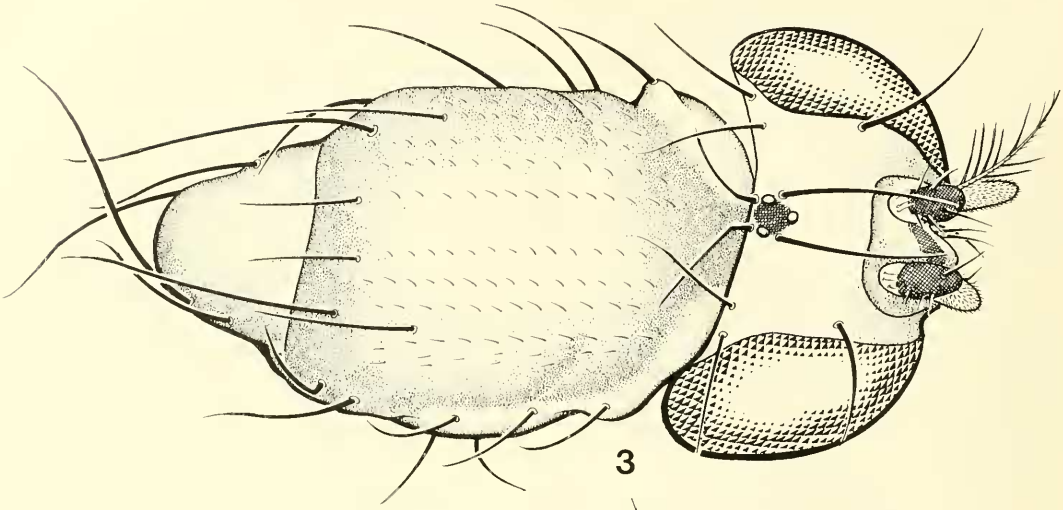
Abdomen: Tergites dark brown.

Measurements.—Head width 1.02 mm; thorax length 1.26 mm; body length 2.913 mm; distance between apices R_1–R_{2+3} 1.04 mm; distance between apices R_{2+3}–R_{4+5} 0.12 mm; length along basal segment of vein M/apical segment 0.29/0.91 mm.

Type material.—Holotype ♀ (AMNH 11856): the specific provenance is unknown within the Dominican Republic; the inclusion is in a small piece of amber (0.7 × 1.3 cm; 1.1 × 1.3 cm before cutting) that is medium yellow and has two layers of fine bubbles and no other insect inclusions.

Etymology.—The specific epithet, *facianota,* is of Latin derivation and alludes to the brown, bigeminate spot on the face.

Remarks.—Although similar to *P. amberifera* and *P. annectans,* this species is distinguished as follows: (1) the dark brown ocellar triangle that is distinctly contrasted with the mostly yellow remainder of the frons, (2) the six irregular rows of acrostichal setulae, and (3) apical scutellar setae that are strongly cruciate near their bases.



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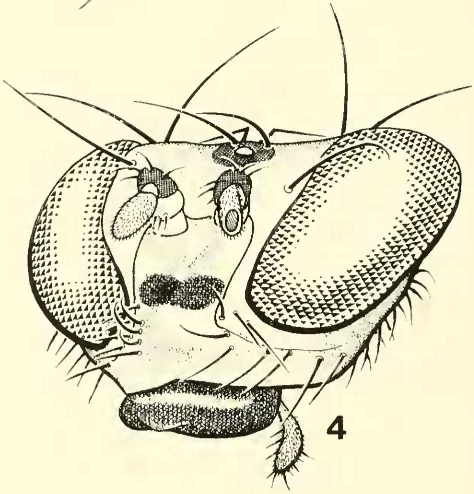

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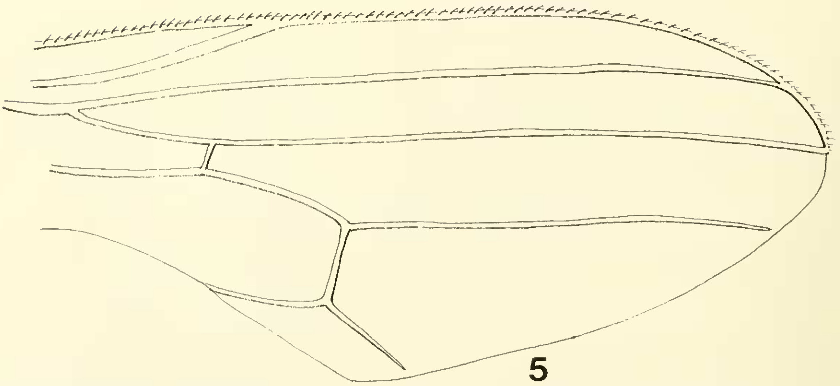

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Figs. 3–5. *Periscelis facianota.* 3, head and thorax, dorsal view. 4, head, anterior view. 5, wing.

Periscelis (*Myodris*) *brodzinskyi* Grimaldi and Mathis, New Species

Fig. 6

Description.—This specimen is obscured by an ant that is on top of the specimen. The ant's mandibles are apparently biting into the fly's scutellum. The fly is intact, but the wings are not fully visible. The left wing is folded on top of the abdomen, and the right wing is partially hidden.

Head: Frons mostly pale yellow, fronto-orbital plates slightly darker. Fronto-orbital seta inserted about midway along length of frons. Inner and outer vertical setae obscured; ocellar setae inserted within ocellar triangle, reclinate, length obscured. Antenna: scape and pedicel yellowish, scape slightly darker and bearing larger seta on medial surface, 1 on anterolateral surface, 3 smaller ones on ventrolateral margin; arista plumose, with 5 dorsal and 3 ventral branches (and very small terminal fork). Face obscured, but setae can be seen in lateral view: row of 4–5 oriented mediad; with 3 setae ventrolateral to these, oriented laterad. Lateral oral margin with 5–6 setae. Gena with several small setulae, but no larger seta. Eye pale.

Thorax: Notum partially obscured by ant, but apparently pale, yellowish gray with some light brown areas. Postpronotum bearing a smaller seta anteriorly in addition to larger seta; posterior notopleural seta slightly smaller; anterior dorsocentral seta short, length about ½ that of posterior seta; 1 large katepisternal seta (oriented dorsad) and several smaller ones; a pair of long apical scutellar setae present, tips nearly touching, length slightly greater than posterior dorsocentrals; anterior scutellar setae obscured. Legs: fore and mid femora pale brown, other segments and hind legs paler; tibiae uniformly colored, lacking bands; fore femur with row of 3 larger setae on apical half of ventral surface; tarsomere 1 about equal in length to tarsomeres 2 + 3 + 4; mid tibia with large apical spine on medial surface, length nearly twice width of tibia. Left wing adpressed to abdomen; right wing mostly visible; humeral vein present; subcostal vein short, length less than ½ length of cell sc and not sharply upturned toward costal vein; vein R_1 long, nearly ½ length of wing; vein R_{4+5} straight, equidistant between R_{2+3} and M_1; veins R_{2+3} and M_1 slightly sinuous, with apices slightly divergent; pale subapical band of infuscation present; veins CuA_1 and M_1 convergent at crossvein m-cu; basal cells of wings obscured.

Abdomen: Most of abdomen and genitalia obscured.

Measurements.—Head not measurable; body length 3.65 mm; thorax length 1.37 mm; wing length 2.20 mm; distance between apices R_1–R_{2+3} 1.10 mm; distance between apices R_{2+3}–R_{4+5} 0.124 mm; length along basal portion of vein M/apical portion 0.34/0.93 mm.

Type material.—Holotype (sex ?; AMNH DR-8-207B): the specific provenance is unknown within the Dominican Republic; the inclusion is a large piece of amber (4.0 × 3.3 cm) that is dark yellow and has several small inclusions, including a male ant and a mymarid wasp.

Etymology.—It is a pleasure to name this genitive patronym after Mr. Jacob Brodzinsky, whose enthusiasm for fossils in amber and entrepreneurial skills made the amber pieces we studied from the Dominican Republic available to our study.

Remarks.—This species differs markedly from the preceding two species and is easily distinguished by the: (1) densely microtomentose mesonotum that is mostly pale gray with some brown spots (the mesonotum in the preceding species is entirely black, with at most sparse microtomentum); (2) fore femur bearing 3 prominent setae along apical half of posteroventral surface (there are 5–6 setae in the other species); (3) tibiae uniformly colored (the tibiae in the other fossil species are distinctly banded.

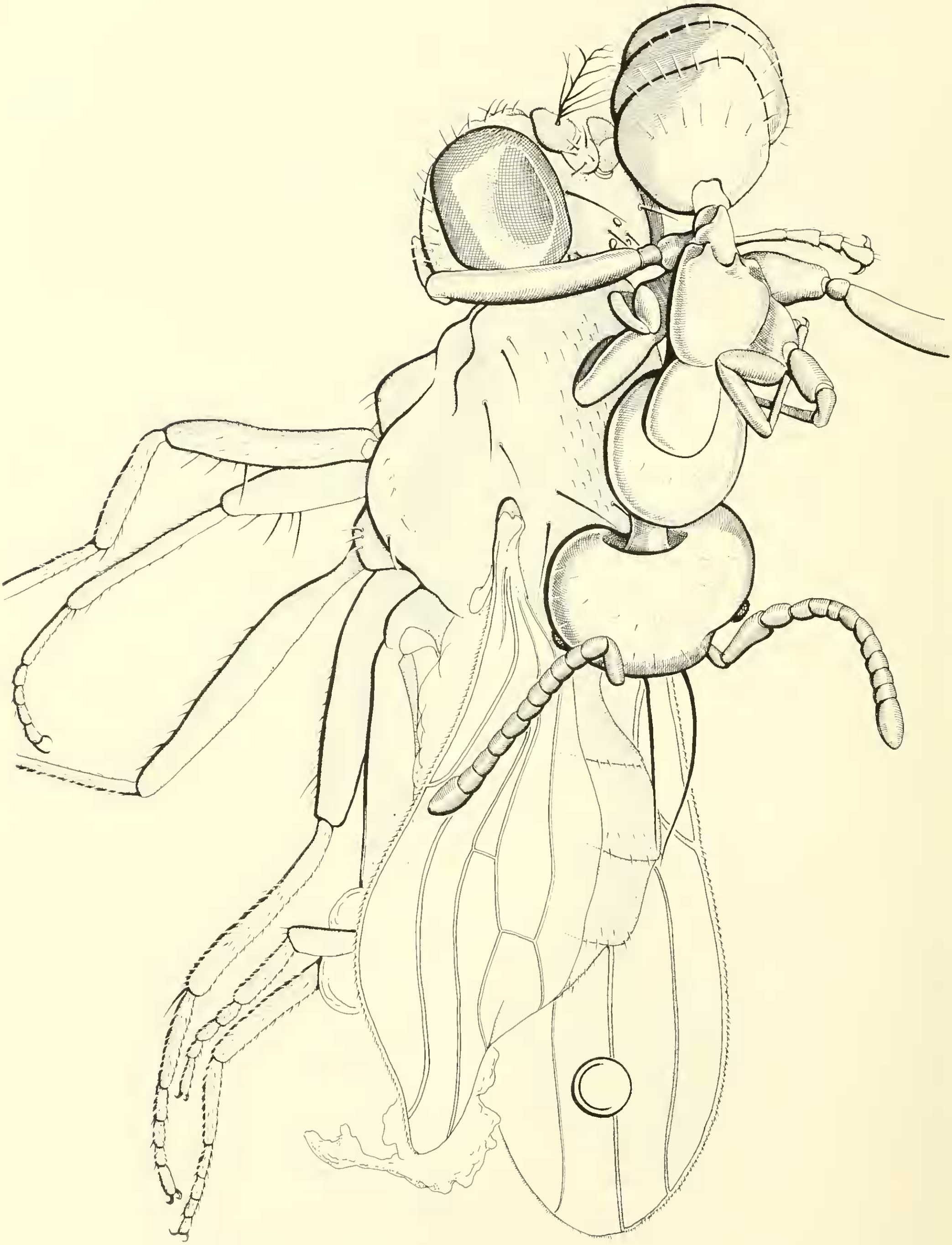


Fig. 6. *Periscelis brodzinskyi* (with ant biting into thorax), dorsolateral view.

Periscelis (*Myodris*) *annectans* Sturtevant

Figs. 7–9

Periscelis annectans Sturtevant, 1963: 122.

Description (taken in part from Sturtevant 1963).—*Head* (Figs. 7, 8): Frons with ocellar triangle dark brown, contrasted with paler lateral and anterior margins. Antenna with flagellomere 1 arising from ventral apical surface of pedicel; antennal bases rather close together, closer to each other than either is to margin of eye; arista with 7 dorsal and 3 ventral branches. Face yellow, with a transverse ridge.

Thorax (Figs. 7, 9): Mesonotum and pleuron generally and uniformly dark brown, with microtomentum sparse or lacking. Chaetotaxy as follows: anterior acrostichal setulae sparse and minute; prescutellar acrostichal setae moderately well developed, inserted just posterior to level of posterior dorsocentral setae; 2 postsutural dorsocentral setae and apparently a few minute setulae extended anteriad from larger setae; 1 postpronotal seta; 2 notopleural setae; 1 supra-alar seta; 1 postalar seta; 2 lateral scutellar setae, basal seta about ⅔ length of apical seta; scutellar disc bare. Anepisternum bare. Wing apparently hyaline (difficult to discern); crossvein dm-cu apparently straight. Legs: Tibiae yellow but interrupted by sub-basal and subapical dark bands.

Abdomen: Concolorous with mesonotum.

Measurements.—Head width 0.91 mm; thorax length 0.96 mm; body length 2.52 mm; wing length 1.79 mm.

Type material.—The amber piece containing the holotype ♀ (?, apex of abdomen partially obscured) was found in Mexico. Chiapas: Las Cruces landslide (23 km SE Simojovel, 6.8 km SE Rancho Santo Domingo). The holotype is deposited at UCAL (Paleo. 12639)]. The piece of amber has become dark colored, reddish brown (slightly ruby from some angles) due to exposure to air and the process of oxidation. The dark coloration, which is apparently irreversible, makes examination of the inclusion difficult.

Remarks.—Our placement of this species in the subgenus *Myodris* is tentative, being based primarily on the presence of prescutellar acrostichal setae. The characters of the wing, the shape of crossvein dm-cu in particular, could not be accurately determined as the wing of the specimen is too obscure to be studied.

Subfamily Stenomicrinae Papp

Stenomicridae Papp, 1984b: 61.

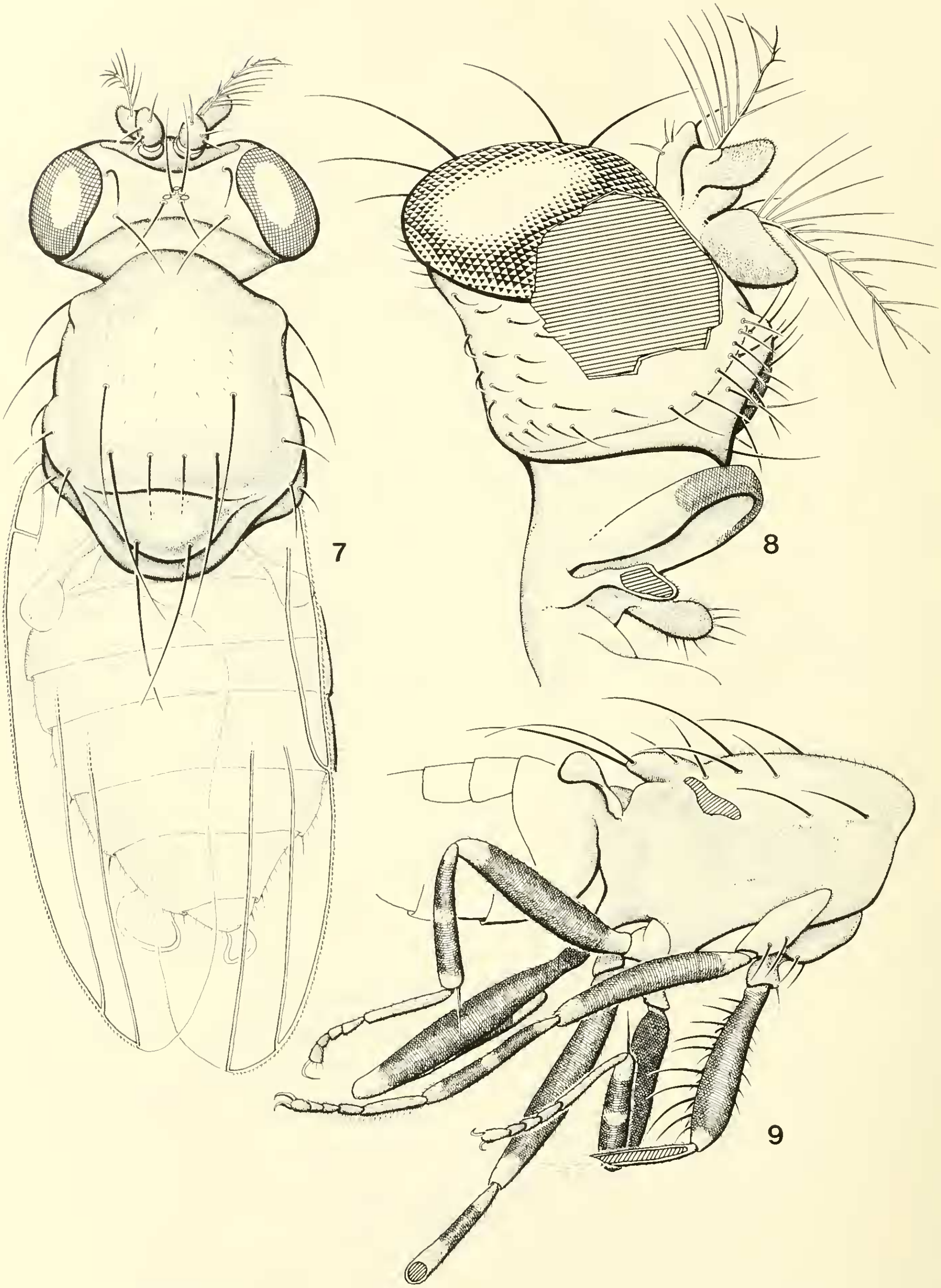
Diagnosis.—*Head:* Frons with 2 fronto-orbital setae, 1 reclinate, 1 proclinate; at least 1 vertical seta (apparently the outer) present; postocellar setae usually lacking (present in *Stenomicra*, where they are slightly divergent); ocellar setae lacking. Pedicel bearing 1 or more dorsoapical setae.

Thorax: Postpronotum frequently polished, lacking a well-developed seta. Wing: costa extended to vein M; cell *cup* usually present, CuA_2 usually well developed (very weakly developed or lacking in *Stenomicra*). Middle tibia with ventroapical spine-like seta.

Discussion.—The subfamily Stenomicrinae was first proposed as a monogeneric family with *Stenomicra* as its type genus (Papp 1984b). As we accept McAlpine's (1978, 1983) proposal that *Stenomicra* is closely related to *Planinasus* and *Cyamops* and that this assemblage of genera and those of the subfamily Periscelidinae are likewise closely related, we prefer recognition of an expanded concept of Periscelididae, with Periscelidinae and Stenomicrinae as included subfamilies.

KEY TO FOSSIL GENERA OF THE SUBFAMILY STENOMICRINAE

1. Frons with 1 pair of intrafrontal setae; eyes lacking interfacetal microsetulae; inner vertical seta present, orientation inclinate. Katepister-



Figs. 7–9. *Periscelis annectans* Sturtevant. 7, body, dorsal view. 8, head, latero-oblique view. 9, thorax, lateral view.

num with 2 subequal setae; 1 supra-alar seta well developed. Crossvein bm-cu absent, making cells bm and dm confluent; vein CuA_2 well developed; cell *cup* present. Hind femur bearing anterodorsal, preapical seta .... *Planinasus* Cresson

– Frons lacking intrafrontal setae; eyes microsetulose, sometimes sparsely; inner vertical seta present but with proclinate orientation. Katepisternum bearing 1 prominent seta; lacking a supra-alar seta. Crossvein bm-cu absent, making cells bm and dm confluent; vein CuA_2 weak or lacking; cell *cup* lacking. Hind femur lacking anterodorsal, preapical seta .... *Stenomicra* Coquillett

Genus *Planinasus* Cresson

Planinasus Cresson, 1914: 245 [in the family Ephydridae]. Type species: *Planinasus ambiguus* Cresson, by original designation; 1918: 65 [discussion, genus probably not in Ephydridae].—Malloch, 1934: 52 [generic key in the family Periscell[di]dae].—Curran, 1934: 327 [generic key in the family Drosophilidae].—Hennig, 1969: 614–616 [revision in the family Aulacigastridae].—McAlpine, 1983; 56 [discussion, assigned to the family Periscelididae].

Schizochaeta Malloch, 1934: 52 [type species: *Schizochaeta shannoni* (Malloch, by original designation].—Hennig, 1969: 614 [synonymy].

Diagnosis.—*Head:* Frons with 1 pair of intrafrontal setae; both inner and outer vertical setae well developed; postocellar seta absent. Interantennal space at least equal to antennal length, much greater in some species; flagellomere 1 arising from anterior surface of pedicel; arista bipectinate. Face uniformly sclerotized and usually arched, bearing a prominent, dorsoclinate, sometimes convergent to cruciate pair of setae near or on transverse facial carina, usually with several other facial setae, these usually ventroclinate and sometimes arranged in a transverse row. Eye bare of interfacetal microsetulae. Gena very short, height less than width of pedicel, lacking a genal seta.

Thorax: Dorsocentral setae 2, both postsutural (*P. ambiguus* with a 3rd small, anterior, dorsocentral seta, less than ⅓ length of either posterior 2); 1 supra-alar seta; 1 postalar seta; lateral scutellar setae 1 pair, apical, scutellar disc bare; postpronotum bare, shiny; anepisternal seta(e) present; 2 katepisternal setae, anterior seta slightly weaker. Wing: no costal breaks (a weakness in the costa just apicad of the humeral crossvein); costal vein extended to vein M; subcosta rudimentary, neither reaching costal margin nor fused apically with vein R_1; vein R_{2+3} minutely but densely trichiose on ventral surface; crossvein bm-cu present, with distinct discal cell and cell *bm*; cell *cup* present, vein CuA_2 well developed. Legs: fore femur with 1–2 posteroventral setae at apical ⅓; mid tibia with apicoventral spine; hind femur with anterodorsal preapical seta; all tibiae with subapical dorsal seta.

Abdomen: 7th spiracle ("stigma") not free in female postabdomen. See Griffiths (1972) for discussion of male terminalia.

Distribution.—Known only from the New World tropics.

Discussion.—This genus is now being revised (Mathis and Baptista, pers. comm.), and the information on the new species described here is written within the context of their study. Within the subfamily Stenomicrinae, *Planinasus* is similar to *Cyamops*, and the two lineages may be sister groups. Evidence for this relationship is the following synapomorphies: 1. Mid tibia with an apical, anteroventral spine. 2. Arista bipectinate (McAlpine 1983: 56). 3. Face bearing a dorsoclinate pair of setae, these usually inserted above the other facial setae.

Planinasus is distinguished from other genera of Periscelididae and its monophyly is established by the following apomorphic characters: 1. Frons bearing a pair of intrafrontal setae with an upright to slightly reclinate orientation. Within Stenomicrinae, intrafrontal setae, as described, are unique to *Planinasus*. 2. Fore femur with

2–3 posteroventral setae on apical half. 3. Scutellum bearing a single pair of apical marginal setae. 4. Reclinate fronto-orbital seta inserted behind proclinate fronto-orbital seta. 5. Each tibia with a dorsoapical seta. 6. Hind femur with a subapical dorsal seta.

Planinasus electrus Grimaldi and Mathis, New Species

Figs. 10–13

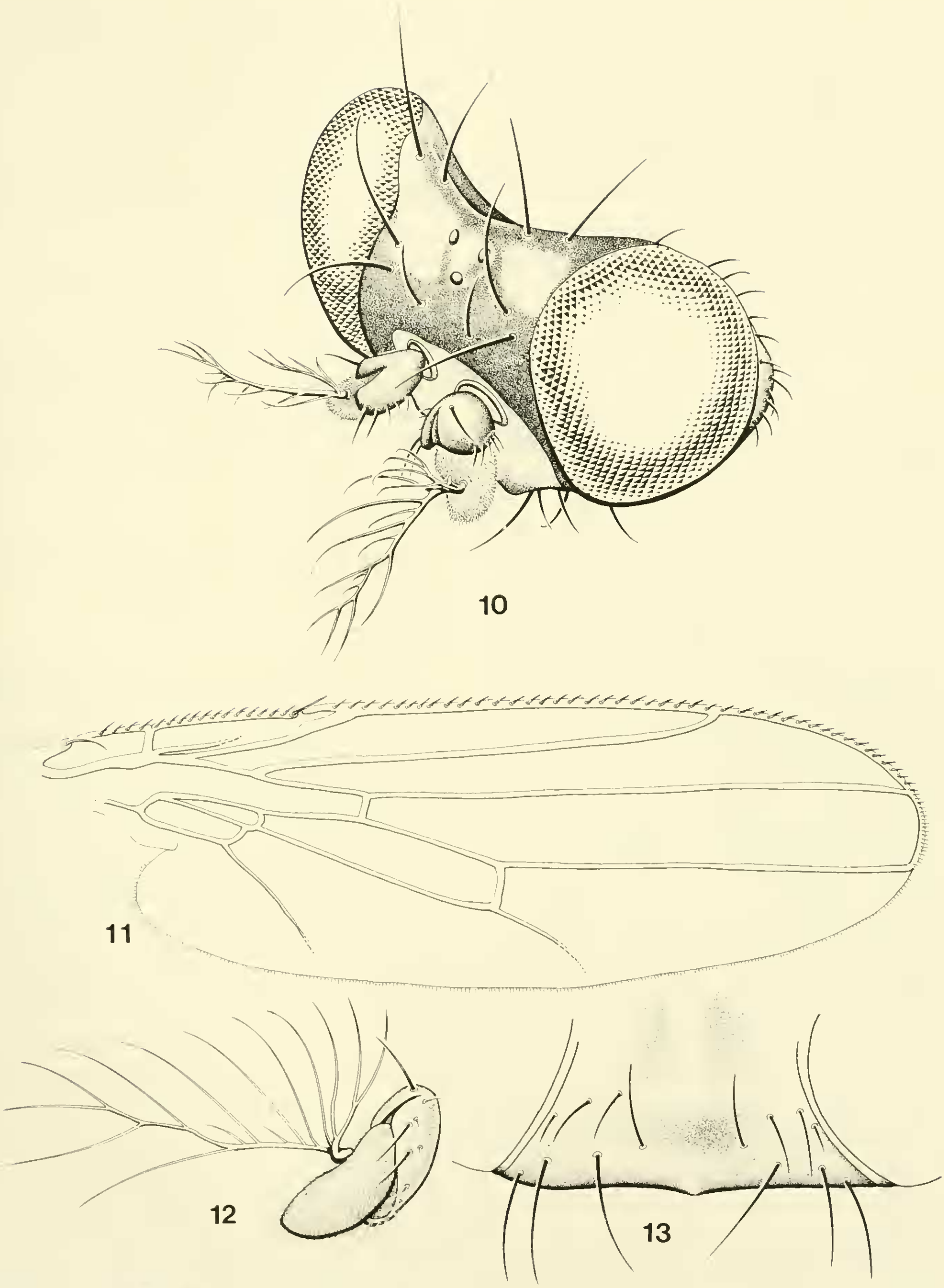
Description.—*Head* (Fig. 10): Frons dark brown, glabrous; intrafrontal seta short, about ½ length of outer vertical seta, reclinate, separated by slightly more than distance between outside margins of posterior ocelli; postocellar seta lacking; proclinate and reclinate fronto-orbital setae approximately equal in length, reclinate seta inserted slightly medial to proclinate seta, separated from latter by about 3 times its diameter at base; inner and outer vertical setae about equal in length. Antenna (Fig. 12): bicolored, scape and pedicel brown, flagellomere 1 pale, mostly whitish yellow with pale brown area immediately around base of arista; scape very thin; antennal bases separated by about diameter of pedicel; pedicel with deep anterior cleft; ventral projection of pedicel short, not extended anteriorly much beyond dorsal margin; medial half of pedicel with 2 black, stout setae of equal length, both oriented anteriad, parallel; lateral half of pedicel with thin seta dorsally, near cleft, and 4–5 fine, smaller setulae in row on anterolateral margin; flagellomere 1 short, width about ⅔ length; arista with lateral trunk bearing 4 branches, all on one side; apical branch pair smallest; main ramus of arista with 4 large dorsal branches, plus terminal fork; 4 smaller medial branches; 2 ventral branches; both rami of arista with a common base, but no common ramus. Face bicolored, mostly pale, whitish yellow, but with oral margin and narrow medial extension brown; facial setae (Fig. 13) in 2 irregular rows; setae along ventral row larger, medial pair dorsoclinate followed by 3 ventroclinate to slightly inclinate setae in row along sloping line at transition between pale and brown coloration; 2 other facial setae inserted dorsad of longer row, between large dorsoclinate setae and anteroventral margin of eye (seta inserted closer to eye almost twice length of seta inserted between it and dorsoclinate setae). Proboscis pale; palp thin, pale.

Thorax: Mesonotum and pleuron dark brown; anterior dorsocentral seta about midway between anterior margin of notum and notal-scutellar suture; posterior dorsocentral seta inserted closer to scutellum than to anterior dorsocentral seta; acrostichal setulae minute, barely discernable; katepisternum with 1 larger seta, 3–4 much smaller setae; anepisternum with row of about 4 fine setulae along posterior margin. Legs: coxae and femora brown; tibiae mostly brown, apical ¼–⅕ pale; length of basal tarsomere about equal to length of all 4 distal tarsomeres; tarsomeres 1–4 pale; all pretarsi brown; mid tibia bearing several small setae (lengths about ½ that of tibia width); 1 ventroapical, 1 preapical lateral, and pair of dorsoapical. Halter pale. Wing (Fig. 11): hyaline; vein R_1 thickened at merger with C; Sc very short, incomplete; subcostal break present, but not well defined; vein R_{2+3} extended to about apical ⅓ of R_{4+5}; veins R_{4+5} and M_1 parallel; apices of veins CuA_1 and A_1 tapered, not extended to wing margin; cells *cup, bm,* and *dm* complete.

Abdomen: Relatively flat dorsoventrally; tapered apically. Tergites and epi- and hypoproct uniformly brown.

Measurements.—Head width 0.78 mm; width of face at narrowest point 0.25 mm; thorax length 0.74 mm; body length 2.20 mm; wing length 1.71 mm; distance between apices of R_1–R_{2+3} 0.77 mm; distance between apices R_{2+3}–R_{4+5} 0.44 mm; length along basal portion of vein M/apical portion 0.35/0.91 mm.

Type material.—Holotype ♀ (AMNH DR-8-208): specific provenance unknown within the Dominican Republic; size of piece of



Figs. 10–13. *Planinasus electrus.* 10, head, dorsolateral view. 11, wing. 12, antenna. 13, oral margin of face, showing arrangement of setae.

amber 1.1 × 1.3 cm, nearly flat (originally oval but corner trimmed off to better view face of specimen), clear yellow, with a milky layer of numerous fine bubbles.

Etymology.—The specific epithet, *electrus,* is derived from the Greek word *elektron,* meaning "amber."

Remarks.—The coloration of the face and pattern of facial setae in this species are apparently unique and easily distinguish it from congeners.

Genus *Stenomicra Coquillett*

Stenomicra Coquillett, 1900: 262. Type species: *Stenomicra angustata* Coquillett, by original designation.—Hendel, 1931: 10–12 [redescription].—Sturtevant, 1954: 560 [revision].—Hennig, 1958: 633–635 [generic characters, relationships].—Sabrosky, 1965b: 209–218 [revision Asiatic species]; 1975: 663–676 [revision afrotropical species].

Podocera Czerny, 1929: 93. Type species: *Podocera ramifera* Czerny, by monotypy.—Hendel, 1931: 10–12 [synonymy].

Neoscaptomyza Séguy, 1938: 347. Type species *Neoscaptomyza bicolor* Séguy, by original designation.—Sabrosky, 1975: 664 [synonymy].

Diadelops Collin, 1944: 265. Type species: *Diadelops delicatus* Collin, by monotypy.—Sturtevant, 1954: 560 [synonymy].

Diagnosis.—Small, slender flies, length 1.5–1.75 mm.

Head: Head in profile peculiarly angulate below, snout-like, projected forward at vibrissal angle; frons lacking intrafrontal setae; 1 well-developed fronto-orbital seta, preceded by a shorter seta that may be weak, hair-like, or somewhat longer and stronger, at its maximum development almost as strong as the fronto-orbital seta; outer vertical seta long, slightly reclinate; inner vertical seta proclinate, inserted well apart from outer seta, sometimes weak or absent. Arista pectinate. Eye bearing sparse interfacetal microsetulae; eye in profile more or less diagonal and length greater than width, with some enlarged facets either above or below. Face narrowed at the vibrissal angle, the eyes obviously closer together at the vibrissal angle than at the vertex, their inner margins appearing more or less emarginate at level of antennae. Face sloped anteroventrally from base of antenna to vibrissal angle, usually with slight median carina, smooth in a few species, wide above and narrow below; vibrissal angles prominent, especially in profile, the lower end of facial plate often forming a sharp rim above vertical epistomal area which continues around the oral opening as a broad to narrow peristomal area; median plate of clypeus a long, narrow, inverted U. Haustellum and labella broad and short, tending to fill the oral opening. Palp reduced, papilliform, difficult to discern.

Thorax: Mesonotum almost bare of setulae, typically with only the median acrostichal setulae and a dorsocentral row laterad, the former incomplete posteriorly and sometimes absent, the latter terminated with 1–2 postsutural, dorsocentral setae; lacking supra-alar setae; scutellum conical, rounded distally, bearing 1 pair of apical setae; postscutellum strongly developed, convex, nearly or quite attaining apex of scutellum; 1 postpronotal seta, weak; 1 presutural seta; posterior notopleural seta on callosity and well removed dorsally from notopleural suture; anepisternum and anepimeron usually bare; 1 katepisternal seta. Wing long and relatively narrow, usually narrowed at base with alula absent or very narrow and lacking fringe of hairs; vein R_1 very short; vein R_{2+3} usually very long; veins R_{4+5} and M parallel to subparallel, often slightly convergent at apex of wing; CuA_1 weak, not extended to margin of wing or absent; cells bm and dm distinct, partially separated, or confluent; vein CuA_2 weak or lacking; cell *cup* lacking. Legs: fore femur with 1 or more strong, straight posteroventral setae on distal half; mid tibia apically with strong, straight, ventral spur-like seta; hind femur lacking anterodorsal, preapical seta.

Abdomen: Slender and elongate, usually 7 tergites visible in addition to genital segments; sternites becoming broader distally; 7th segment a complete ring.

KEY TO FOSSIL SPECIES OF *STENOMICRA*

1. Inner vertical seta lacking; crossvein r-m apparently lacking; body uniformly pale, mostly pale yellow ...... *S. anacrostichalis*, new species
– Inner vertical seta present, proclinate; crossvein r-m present; body generally darker .... *S. sabroskyi*, new species

Stenomicra sabroskyi **Grimaldi and Mathis, NEW SPECIES**
Figs. 14–16

Description.—All setae pale; body with considerable brown coloration.

Head (Figs. 14, 15): Frons with middle portion slightly darker than fronto-orbits; 2 fronto-orbital setae, inserted on anterior ⅓ of frons, anterior seta inclinate, about ½ length of posterior, reclinate seta; inner vertical seta proclinate; outer vertical seta very pale, slightly shorter than reclinate fronto-orbital seta, parallel and reclinate. Eyes with sparse, thin interfacetal setulae; shape of posterior margin with typical concave margin and wide gena. Frontal margins of eyes convex at level of antenna; margins closest just above level of vibrissae. Antenna: scape, pedicel, and flagellomere 1 yellow; pedicel slightly elongate, overlapping flagellomere 1 anteriorly; arista plumose, with 4 dorsal and 2 ventral branches, plus terminal fork. Face with slight carina, extended between apices of flagellomere 1 and vibrissae; 1 pair vibrissae present, slightly divergent, upturned, inserted very close together, bases separated about 3 times diameter of setae; row of about 4 setae posterior to vibrissae, along oral margin; seta at posteroventral corner of eye long, straight, thin, pointed ventrad. Clypeus narrow, yellow. Proboscis obscured by bubble.

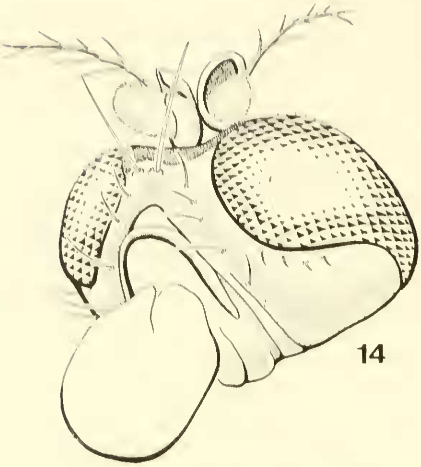
Thorax: Mesonotum pale brown; 2 medial rows apparent of about 4 acrostichal setulae each, rows end at anterior dorsocentral setae. 2 pairs dorsocentral setae present; distance between anterior and posterior dorsocentral setae slightly less than length of anterior seta; posterior dorsocentral set about twice length of anterior seta; 2–3 acrostichal setulae inserted anterior to and in line with ipsilateral dorsocentral setae, lengths about ½ that of anterior dorsocentral. Scutellum triangular, apically pointed, adpressed to postnotum; postnotum slightly longer than scutellum, brown; scutellum with an apical pair of setae; parallel, slightly upturned. Pleuron paler than notum. All legs yellow. Halter yellow. Wings hyaline; crossvein r-m present.

Abdomen: Tapered apicad; 7 tergites visible; tergites virtually bare, without large setae; all tergites brown except yellow tV; tVII apparently a syntergosternite, as in other *Stenomicra* (e.g. McAlpine 1987—note, Teskey (1987) refers to syntergosternite VII); hypoproct yellow, without larger setae.

Measurements.—Head length 0.20; thorax length 0.46 mm; body length 1.32 mm; wing length 1.13 mm; distance between apices R_1–R_{2+3} 0.66 mm; distance between apices R_{2+3}–R_{4+5} 0.27 mm; length along basal portion of vein M/apical portion 0.15/0.65 mm.

Type material.—Holotype ♀ (AMNH DR-6-15D): specific provenance unknown within the Dominican Republic; size of piece of amber 0.9 × 0.6 cm (cut from tear-drop shaped piece originally 2.1 × 1.5 cm), light yellow, with only a few fine bubbles and three minute male cecidomyiids (Diptera).

Etymology.—The species epithet, *sabroskyi*, is a genitive patronym to honor Dr. Curtis W. Sabrosky, who has contributed much to our knowledge of Periscelididae, the genus *Stenomicra* specifically.



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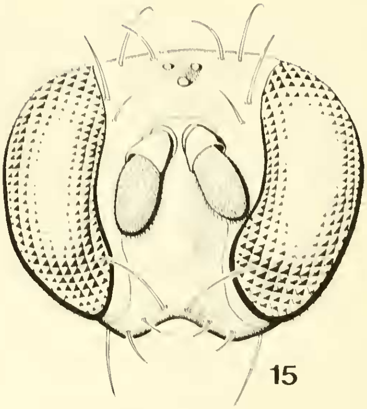

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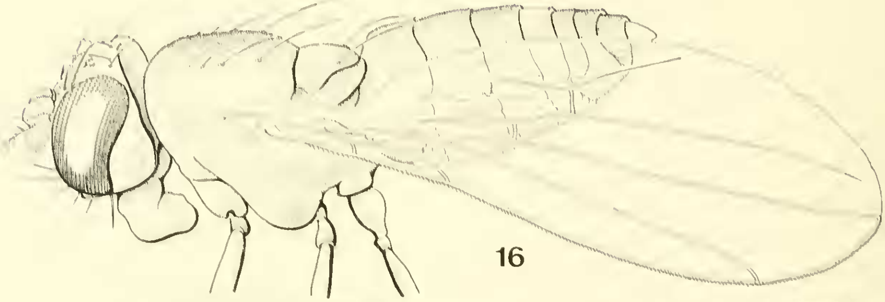

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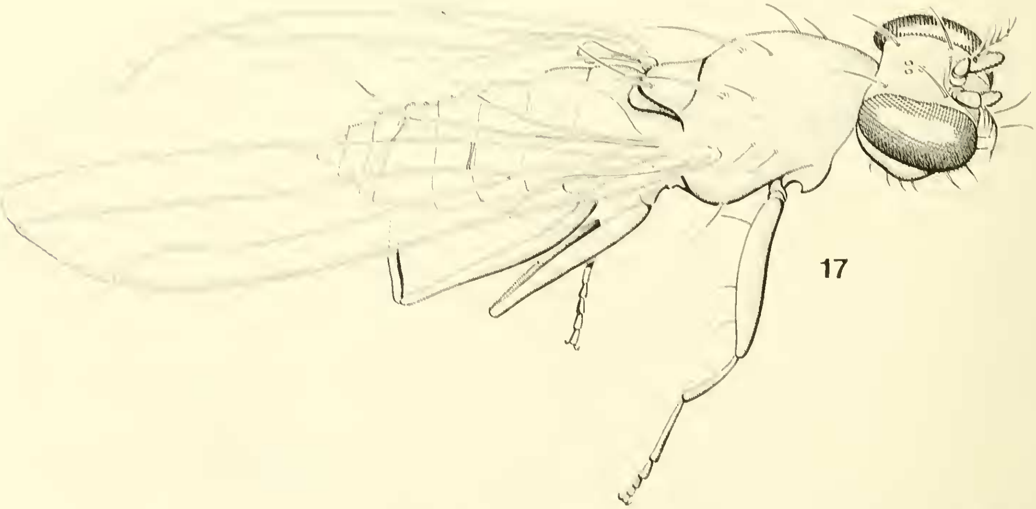

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Figs. 14–17. *Stenomicra* species. 14, head of *S. sabroskyi*, ventro-oblique view. 15, head of *S. sabroskyi*, anterior view. 16, body of *S. sabroskyi*, dorsolateral view. 17, body of *S. anacrostichalis*, dorsolateral view.

Remarks.—See "Remarks" section under the next species.

Stenomicra anacrostichalis Grimaldi and Mathis, New Species

Fig. 17

Description.—All setae pale or golden colored, none black. Body entirely pale, yellowish.

Head: Ocellar triangle darker than remainder of frons; no postocellar setae apparent; fronto-orbital setae as a well-developed reclinate seta and a smaller (length slightly shorter than outer vertical seta), anterior, proclinate seta inserted slightly above lunule; only outer vertical seta present; parallel, directed slightly posteriad; length about equal to length of frons. Antenna: pedicel slightly darker than remainder of antenna, bearing 1 large dorsal seta, directed laterad; several smaller, ventral setae, also directed laterad; flagellomere 1 equal in length to pedicel; arista with 3 dorsal, 2 ventral branches, plus small terminal fork; bases of 1st and 2nd ventral branches closely opposed. Eyes large, faintly red, apparently bare but possibly with fine interfacetal setulae; posterior margin concave, making gena deep. Frontal inner margin of eyes slightly convex, but not strongly so around antennae, as in *S. sabroskyi*; eye margins almost parallel on front; facial margin of eyes very close to pedicel; closest margins of eyes on ventral part of face; face with 1 pair of upturned, slightly divergent setae inserted on small rounded facial area; 4 pairs inclinate facial setae ventro-lateral to upturned facial setae; the ventralmost pair longest (slightly longer, and thinner, than upturned vibrissae). Clypeus apparently deep, with pointed ventral margin.

Thorax: Mesonotum and pleuron uniformly yellow. Anterior dorsocentral seta about ½ width and thickness of posterior seta; distance between base of anterior dorsocentral and notal-scutellar suture slightly greater than length of anterior dorsocentral seta; posterior dorsocentral seta inserted about midway between anterior dorsocentrals and notal-scutellar suture; if acrostichal setulae present, very difficult to discern; postnotum projected slightly behind posterior margin of scutellum. Legs uniformly yellow; fore femur with 2 stiff, thin setae on ventral surface; near base and midline. Wing hyaline; halter pale.

Abdomen: Slightly flattened dorsoventrally; 7 tergites visible; without large setae; yellowish, lacking markings.

Measurements.—Head length 0.24; thorax length 0.52 mm; body length 1.42 mm; wing length (from actual base) 1.42 mm; distance between apices R_1–R_{2+3} 0.83 mm; distance between apices R_{2+3}–R_{4+5} 0.21 mm; length along basal portion of vein M/apical portion obscured.

Type material.—Holotype ♀ (AMNH 63): specific provenance unknown within the Dominican Republic; size of piece of amber 1.4 × 0.9 cm, dark yellow, center is frothy with dense bubbles. This piece of amber also contains a specimen of *Euceroplatus* sp. (Mycetophilidae).

Etymology.—The species epithet, *anacrostichalis*, refers to the apparent absence of acrostichal setulae in this species.

Remarks.—Easily distinguished from the other fossil species of *Stenomicra* in Dominican amber by: eyes are more laterally situated; frontal margins of the eyes less convex and much closer together; and acrostichal setulae absent.

ACKNOWLEDGMENTS

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